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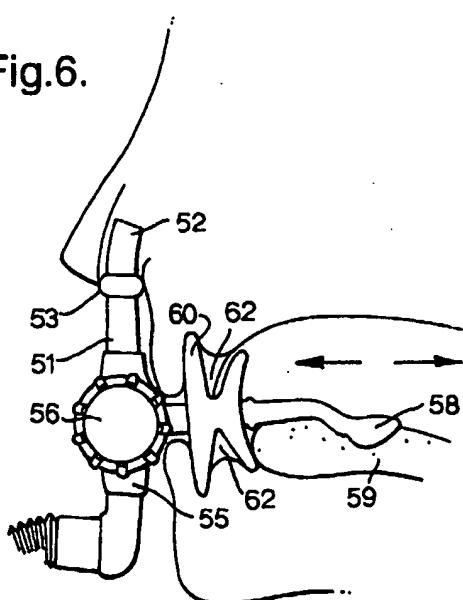
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(54) Abstract Title

(57) A patient ventilation device comprises means 52 for supplying ventilation gas to the nasal passage of a patient and means 60 to prevent the escape of ventilation gas through the mouth. In other embodiments of the invention the means to prevent oral ventilation comprises adhesive tape placed across the mouth. The means for supplying gas to the nostrils may be via two separate branch nasal tubes 12, 13 which each enter the nostril passageways and have sealing rings 14 to engage the nostril walls.

Fig.6.



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Fig.1.

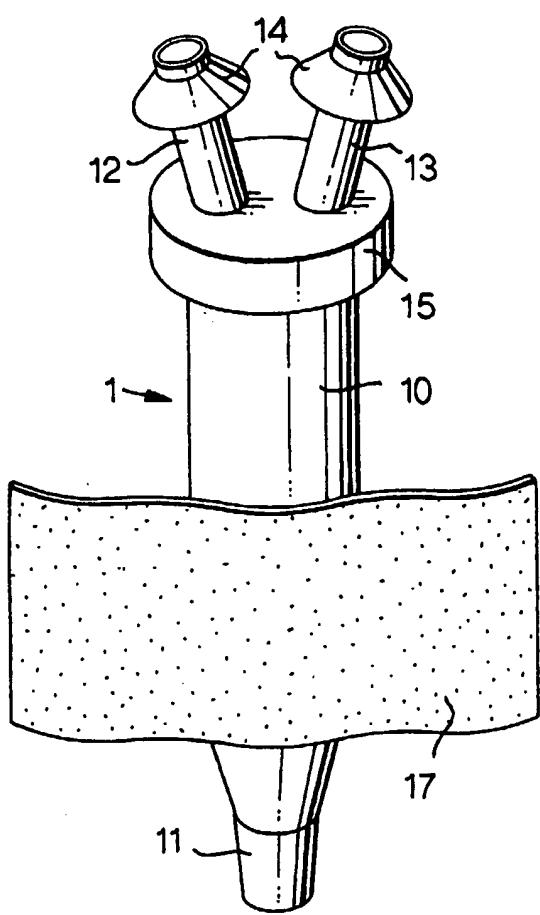


Fig.2.

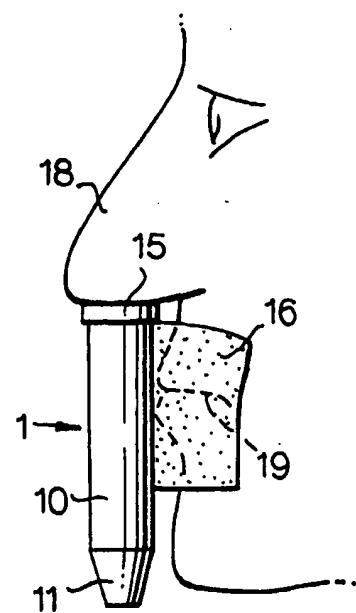


Fig.3.

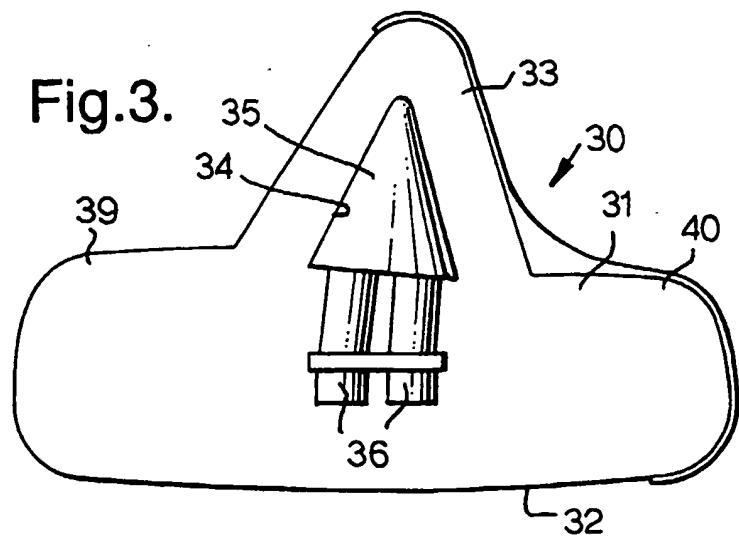


Fig.4.

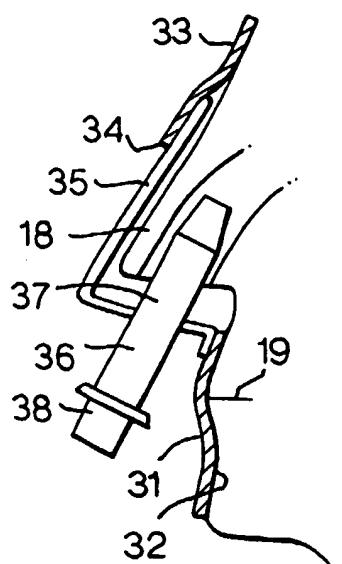


Fig.5.

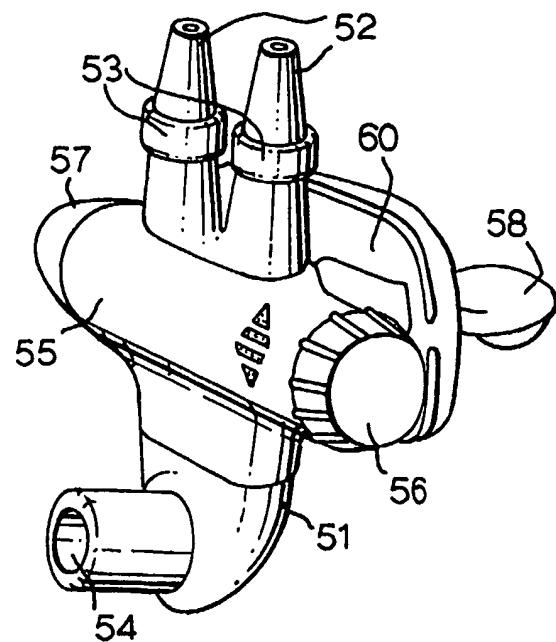


Fig.6.

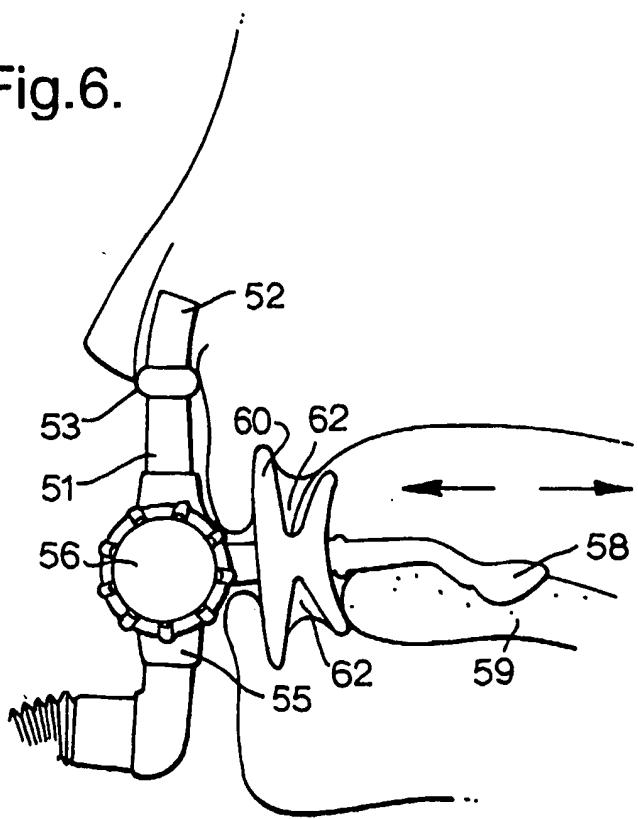


Fig.7.

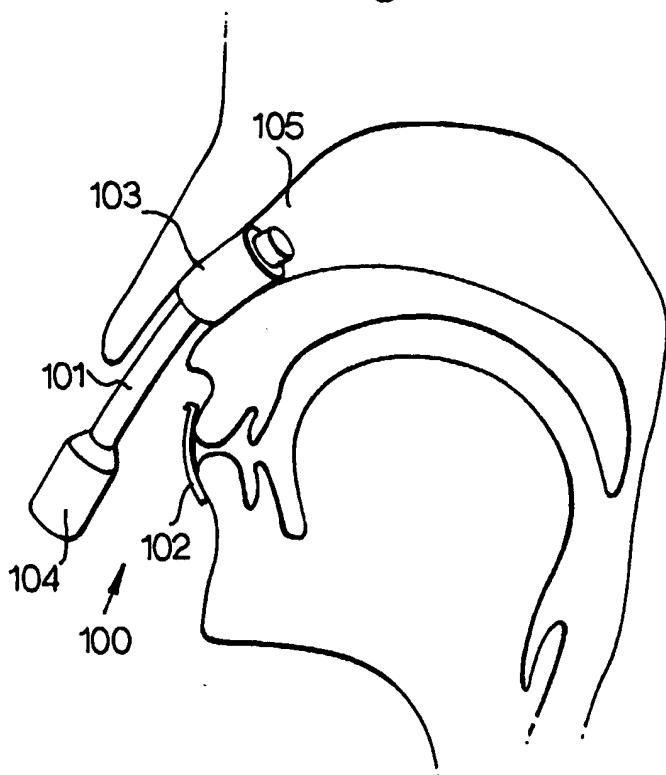


Fig.8.

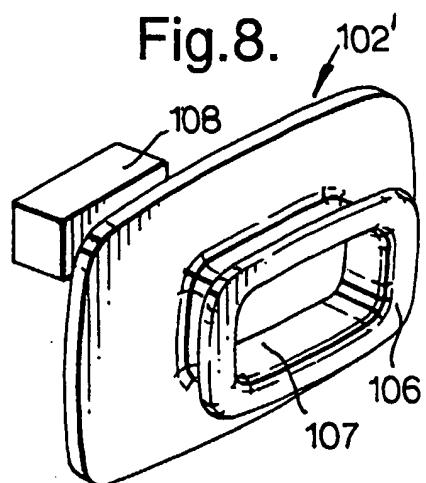


Fig.9.

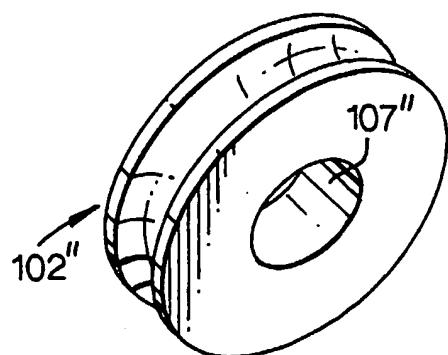


Fig.10.

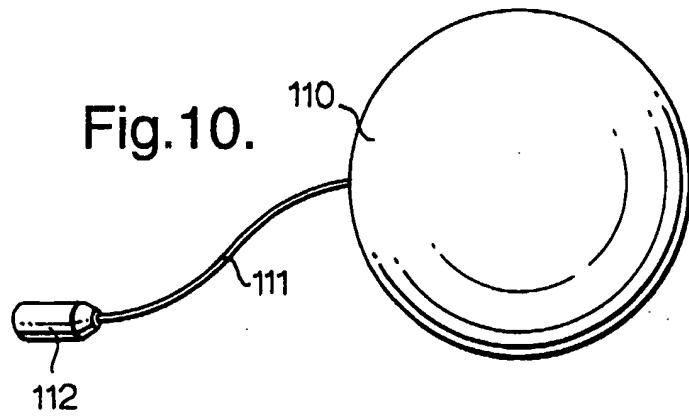
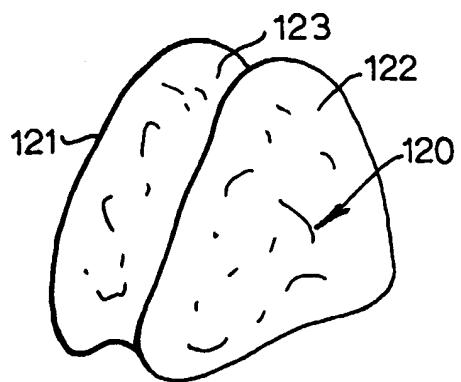


Fig.11.



MEDICO-SURGICAL APPARATUS

This invention relates to medico-surgical apparatus.

The invention is more particularly concerned with apparatus for ventilating patients. Patients can be ventilated in various different ways. Ventilation gas can be supplied to the patient's trachea by means of an endotracheal tube inserted through the mouth or by a tracheostomy tube inserted through a surgically-made opening in the neck. Laryngeal mask airways (LMAs), which seal around the upper end of the trachea, or face masks, which seal around the nose and mouth, are also used for ventilation. Where the patient is breathing spontaneously, gas can be supplied to the nasal passages, such as described in WO9958181, US5042478, US5533506 or US4774946 but such arrangements are not suitable where the patient is not breathing spontaneously because the gas escaping through the mouth does not enable the necessary elevated pressures to be achieved.

It is an object of the present invention to provide an alternative ventilation device.

According to the present invention there is provided a patient ventilation device including means for supplying gas to a nasal passage and means for preventing escape of ventilation gas through the mouth.

The means for supplying ventilation gas to a nasal passage may include a nasal tube inserted in the or each nasal passage. The or each nasal tube may include a seal and may be movable relative to the means for preventing escape of gas through the mouth. The or each

nasal tube is preferably movable by ratchet means. The means for preventing escape of gas through the mouth may include a device inserted in the mouth such as including a gum shield and a member that engages the tongue. Alternatively, the means inserted in the mouth may include an inflatable cuff or a sack containing a conformable material. Alternatively, the means for preventing escape of gas through the mouth may include an adhesive material sealed around the mouth. The means for supplying gas to the nasal passages may include a nose piece covering the nose and may include an adhesive sealing the nose piece around the nose. The adhesive preferably includes a hydrocolloid. Alternatively, the means for supplying ventilation gases may be separate from the means for preventing escape of gas through the mouth.

Several different nasal ventilation devices, according to the present invention, will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a first device;

Figure 2 is a side elevation view showing the device in use;

Figure 3 is a front view of a second device;

Figure 4 is a side elevation view illustrating the second device in use;

Figure 5 is a perspective view of a third device;

Figure 6 is a side elevation view of the device of Figure 5 in use;

Figure 7 is a side elevation view of a fourth device; and

Figures 8 to 11 are perspective views of four alternative mouth parts for the fourth device.

With reference first to Figures 1 and 2, the ventilation device 1 comprises a tubular shaft 10 of a flexible plastics material having a male tapered connector 11 at its lower end and two short, small-bore branch nasal tubes 12 and 13 at its upper end, which incline slightly away from each other. The upper end of each branch tube 12 and 13 carries a sealing ring 14, such as of a gel material. A larger sealing ring 15 of a similar material is carried by the shaft 10 where the tubes 12 and 13 are joined with it. The device 1 is completed by a flexible tape 16 attached with the shaft 10 and extending transversely of it. The surface 17 of the tape 16 opposite the shaft 10 is adhesive, such as provided by a hydrocolloid material. The adhesive surface 17 is protected before use by a removable release sheet (not shown).

In use, as shown in Figure 2, the branch tubes 12 and 13 are inserted in the nares or nasal passages of the patient's nose 18, the size and shape of the sealing rings 14 being selected so that they form a gas-tight seal between the inside of the nasal passages and the outside of the branch tubes. The larger sealing ring 15 forms a second seal around the outlet of the nares. When the branch tubes 12 and 13 have been inserted, the tape 16 is pressed firmly into contact with the skin around the mouth 19, thereby sealing the mouth closed and

helping to support the device. A ventilation circuit (not shown) can be attached to the connector 11 to supply gas to the shaft and hence to the nose 18 of the patient.

With reference now to Figures 3 and 4, there is shown a second ventilation device 30 having flexible base plate 31 of generally inverted T shape with an adhesive rear surface 32, such as provided by a hydrocolloid. The upper, central part 33 of the plate is triangular in shape having a central triangular aperture 34, the periphery of which is bonded to a rigid, moulded nose piece 35. The nose piece 35 supports two nasal tubes 36, which have one end 37 located within the nose piece and their opposite end 38 located externally. The lower part of the base plate 31 has two side wings 39 and 40 extending on opposite sides of the device.

In use, as shown in Figure 4, the nose piece 35 is positioned to cover the nose 18 and the nasal tubes 36 are inserted in respective nasal passages. The upper part 33 of the plate 31 is then smoothed down onto the skin around the nose 18, and the lower part 39 and 40 of the plate is smoothed down around the mouth 19 so the mouth is sealed closed and the nose piece 35 is sealed around the nose. The patient can then be ventilated by connecting a ventilation circuit to the external ends 38 of the nasal tubes 36. The tubes 36 do not have to seal with the inside of the nasal passages because of the seal provided around the nose piece 35.

With reference now to Figures 5 and 6, the third ventilation device 50 comprises a tubular shaft 51, similar to that in the first device 1, bifurcated at its upper end into two soft, tapered nasal tubes 52 each with a seal 53, which seal close to the entrance of the nostrils. A connector 54 at the lower end of the shaft 51 extends forwardly at right-angles to the shaft. The shaft 51 extends through a support housing 55 having a rotatable ratchet wheel 56 at one

side, which engages ratchet teeth (not shown) on the outside of the shaft 51. In this way, the shaft 51 can be moved up and down by rotating the ratchet wheel 56. A quick release button 57 on the opposite side of the housing 55 can be pushed in to disengage the ratchet from the shaft 51 and enable it to be slid up or down freely. The housing 55 has a rearwardly-extending spatula 58 with a curved lower surface shaped to lie on the upper surface of the tongue 59. Towards its left-hand end, the housing 55 has a gum shield 60 shaped to locate inside the mouth on opposite sides of the teeth and gums to form a seal and block passage of gas through the mouth. The gum shield 60 is of a soft material such as silicone rubber or similar. The spatula 58 and gum shield 60 support the device in position with the patient's mouth.

The device 50 is installed first by inserting the spatula 58 on the housing 55 into the mouth so that it rests on the tongue 59 and the gum shield 60 is positioned to engage opposite sides of the teeth 62. The ratchet wheel 56 is then rotated to slide up the nasal tubes 52 so that they enter the nostrils and seal in the nasal passages. The ratchet engagement of the shaft 51 with the housing 55 retains the two parts in this fixed relationship.

The ventilation device of Figures 5 and 6 could be modified by alternative arrangements for sealing with the mouth, such as, for example a cuff that is inflatable with air, gas or liquid or a sack filled with a gel, foam, liquid or similar conformable material.

With reference now to Figure 7, the fourth ventilation device 100 comprises a single nasal tube 101 and a mouth seal 102. The nasal tube 101 has an inflatable cuff 103 encompassing the tube close to its patient end. At its machine end, the tube has a connector

104. The mouth seal 102, in its simplest form is a piece of adhesive tape secured onto the skin around the mouth so as to seal it closed.

In use, the tube 101 is inserted into one nostril and the cuff 103 is inflated to form a seal with the nasal cavity 105. The other nostril is blocked by a bung or clip. The tape 102 is then secured to the mouth to seal it closed.

Figure 8 shows an alternative mouth seal 102' in the form of a rectangular plate of relatively stiff plastics material having an inwardly-protruding flange 106 around a central opening 107, which, in normal use, is blocked by a removable plug 108. The plate 102' is held in position blocking the mouth by adhesive tape; the plug 108 can be removed for inspection or for inserting a catheter or the like.

Figure 9 shows a further alternative seal 102" similar to that of Figure 11 except that it is oval or round and is made of a soft foam. This also has an opening 107", which is blocked during ventilation.

Figure 10 shows a mouth seal in the form of an inflatable ball 110 having an inflation line 111 and connector 112 by which the ball can be inflated and deflated. The ball 110 is placed in the oral cavity and inflated to engage and seal on the internal surfaces.

Figure 11 shows a seal in the form of a bag 120 of generally dumb-bell shape having enlarged regions 121 and 122 at opposite ends separated by a waisted region 123. The bag 120 contains a gel or other conformable material. In use, the bag 120 is positioned with one

of the enlarged ends 121 or 122 in the oral cavity and with the waisted region 123 located in the region of the lips and teeth.

The present invention enables a patient to be ventilated via the nose. This can be an advantage, such as when there is damage to the mouth. Also, by ventilating through the nose, the inspired gases are warmed and moistened by the patient's nasal passages, thereby reducing the drying of the trachea caused by some other forms of ventilation.

CLAIMS

1. A patient ventilation device including means for supplying ventilation gas to a nasal passage and means for preventing escape of ventilation gas through the mouth.
2. A patient ventilation device according to Claim 1, wherein the means for supplying ventilation gas to a nasal passage includes a nasal tube inserted in the nasal passage.
3. A patient ventilation device according to Claim 2 including two nasal tubes one inserted in each nasal passage.
4. A patient ventilation device according to Claim 2 or 3, wherein the or each nasal tube includes a seal.
5. A patient ventilation device according to any one of the preceding claims, wherein the or each nasal tube is movable relative to the means for preventing escape of gas through the mouth.
6. A patient ventilation device according to Claim 5, wherein the or each nasal tube is movable by ratchet means.

7. A patient ventilation device according to any one of the preceding claims, wherein the means for preventing escape of gas through the mouth includes a device inserted in the mouth.
8. A patient ventilation device according to Claim 7, wherein the device inserted in the mouth includes a gum shield.
9. A patient ventilation device according to Claim 7 or 8, wherein the device inserted in the mouth includes a member that engages the tongue.
10. A patient ventilation device according to Claim 7, wherein the means inserted in the mouth includes an inflatable cuff.
11. A patient ventilation device according to Claim 7, wherein the means inserted in the mouth includes a sack containing a conformable material.
12. A patient ventilation device according to any one of Claims 1 to 6, wherein the means for preventing escape of gas through the mouth includes an adhesive material sealed around the mouth.
13. A patient ventilation device according to any one of the preceding claims, wherein the means for supplying gases to the nasal passage includes a nose piece covering the nose.

14. A patient ventilation device according to Claim 13, wherein the device includes an adhesive sealing the nose piece around the nose.
15. A patient ventilation device according to Claim 12 or 14, wherein the adhesive includes a hydrocolloid.
16. A patient ventilation device according to any one of Claims 1 to 5, wherein the means for supplying ventilation gases is separate from the means for preventing escape of gas through the mouth.
17. A patient ventilation device substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.
18. A patient ventilation device substantially as hereinbefore described with reference to Figures 3 and 4 of the accompanying drawings.
19. A patient ventilation device substantially as hereinbefore described with reference to Figures 5 and 6 of the accompanying drawings.
20. A patient ventilation device substantially as hereinbefore described with reference to Figure 7 of the accompanying drawings.

21. A patient ventilation device substantially as hereinbefore described with reference to Figure 7 as modified by any one of Figures 8 to 11 of the accompanying drawings.
22. Any novel and inventive feature or combination of features as hereinbefore described.



Application No: GB 0119079.2
Claims searched: 1-21

Examiner: Lee Ellison
Date of search: 22 February 2002

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T):

Int Cl (Ed.7): A61M 15/08, 16/04, 16/06

Other: Online: WPI, EPODOC, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y, X	WO98/26829A (BERTHON-JONES) See figures 3, 4, 8 & 12. Page 1 lines 3-6; page 2 lines 18-23; page 5 lines 17-24; & page 9 lines 8-12.	X = 1, 12, 16 Y = 1, 2, 3, 4, 5, 12, 13, 16
X	US6012455A (GOLDSTEIN) See figures 1-6, 9-16, 20, 22 & 24. Column 1 line 52 - column 2 line 4; column 3 line 18 - column 4 line 27; column 4 line 40 - column 5 line 43; & column 6 lines 49-61.	1, 2, 3, 4, 5, 7
X	US5537994A (THORNTON) See figures 1-3. Column 1 line 50 - column 2 line 16; column 2 line 40 - column 3 line 22; & column 3 line 44 - column 4 line 8.	1, 7, 8, 13
Y	US5533506A (WOOD) See figures 1-3. Column 1 lines 6-7 & 47-57; column 2 line 31 - column 4 line 17.	1, 2, 3, 4, 5, 12, 13, 16
X	US4827923A (BISHOP & MORRIS) See figures 1-6. Column 1 line 52 - column 2 line 12; & column 2 line 34 - column 3 line 8.	1, 2, 3, 5, 13

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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Application No: GB 0119079.2
Claims searched: 1-21

Examiner: Lee Ellison
Date of search: 22 February 2002

Category	Identity of document and relevant passage	Relevant to claims
X	AU661266A (BUCKLEY-MENDEZ) See figures 2, 17 & 18. See EPODOC abstract and WPI abstract Acc. No. 1995-269707 [15].	1, 13
X	DE3719009A1 (HÖRMANN) See figures 1-3. See EPODOC abstract and WPI abstract Acc. No. 1989-000496 [37].	1, 7, 8

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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